The Veterinary Record

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 40. OCTOBER 4, 1941. VOL. 53.

AN EXTENSIVE OUTBREAK OF TUBERCULOSIS IN DUCKS

R. F. GORDON, J. S. GARSIDE*, N. DOBSON and J. REID

MINISTRY OF AGRICULTURE, VETERINARY LABORATORY, WEYBRIDGE

Tuberculosis has always been regarded as rare in ducks. Feldman (1938) states that the disease is uncommon in waterfowl generally, and that ducks, even when kept in close association with tuberculous fowls, are seldom affected. This opinion is also held by other workers quoted by Feldman.

Tuberculosis has, of course, been encountered in ducks, but usually in very small numbers or as isolated cases in a flock. For example, Eber (1925), examined 460 ducks and found only one case of tuberculosis, while Klimmer (1930), over a period of 22 years examined 181 ducks and observed the disease in only 1 per cent. Laenkholm encountered tuberculosis in only one duck in a group of 131 examined, and Schlegel found only five cases in 900 ducks examined

Tuberculosis has also been reported in ducks by other workers; by Christien, Germain, and Raymond (1923), who described the disease in a seven-year-old Mandarin drake, by Volker (1924), who described a case of generalised tuberculosis in a five-months-old duck; by Schaaf (1932), who studied the symptoms and pathological changes in eight tuberculous ducks; and by Hinshaw (1933), who recorded tuberculosis in two Muscovey ducks. The only record, however, of what could in any way be regarded as an outbreak is that reported by Craig and Davies (1937) when they found losses due to tuberculosis in a flock of 15 ducks, and on *post-mortem* examination, tuberculous lesions were found in all 15.

HISTORY

Garside and Gordon (1940), when carrying out investigations on salmonella infections in ducks, obtained 113 ducks from a breeding farm and brought them to the Laboratory. The ducks were killed at various intervals over a period of 18 months and *post-mortem* and bacteriological examinations carried out. During the course of this work, 29, or 25·8 per cent., of the ducks examined showed lesions of tuberculosis. These 113 ducks were picked at random, without any reference to condition, from 2,000 ducks of two and three years of age which had reacted to the agglutination tests for salmonella infections applied to a flock of approximately 25,000 head of stock, and it is probably a fair assumption that the figure of 25·8 per cent. infection has some resemblance to the incidence of tuberculosis in the older ducks in the flock.

The stock on the farm comprised approximately 25,000 adult ducks, together with 1,200 geese, a small flock of turkeys, and 30 to 40 game fowl. There were also 30 head of milking cattle; but no sheep or pigs. The farm was well laid out, the management generally, and in particular the hygiene and sanitation, being of a high standard. The land was well drained and each house had an automatic water supply. Each house accommodated 100 ducks and had an outside grass run, but ducks were not allowed water in which to swim except during resting periods, when they were transferred to similar pens having a running stream at the end of the grass run. Runs and houses were rested at convenient intervals, usually three months' rest in 12. As far as possible geese, turkeys and cattle were kept as separate units from the ducks, although in the course of extension ducks were placed on ground which for years had been used for cattle.

Ducks have been kept on the farm for the past 12 years but only in large and increasing numbers to their present total during the past six years. Of the 25,000 ducks on the farm, approximately 10,000 were in their first year, 10,000 in their second year, and 5,000 three years old or older.

The owners had no complaint to make about casualties or disease of adult ducks. Apparently, losses were few and confined to what the owner termed "laying themselves out," which seemed to be sudden cessation of laying and rapid wasting. Little culling was practised, but whole sections of older birds were disposed of during slack seasons in order to rest houses and pens and make room for younger birds.

While at the laboratory the ducks were housed in pairs in metal coops for the first six months, when two breeding pens were set up on land on which no poultry had previously been kept, the remainder of the ducks remaining in the coops. The bulk of the cases of tuberculosis occurred while the ducks were in the coops, eight cases occurring during the first two months the ducks were at the laboratory.

Of the 29 birds found to be affected with tuberculosis, 18 died during the experiment showing advanced generalised lesions of the disease, three were killed showing fairly advanced generalisation, while in the remaining eight killed in the course of the work early isolated tubercles only were observed. Twenty-one of the affected ducks showed either extreme emaciation or were in poor condition, while most of the early cases showed normal health and condition. Apart from this noticeable wasting, no

* Now of The Royal (Dick) Veterinary College, Edinburgh.

definite symptoms were observed, although in one or two cases a persistent diarrhoea was present; no lameness as has been described by other workers was noticed.

Lesions found on Post-Mortem Examination

The lesions observed at *post-mortem* examination varied considerably, from one or two early discrete lesions, in birds which were in good condition and had been killed for other purposes and examinations, to extensive generalisation involving almost every organ, in birds which had died in an emaciated condition. Probably the most striking feature and one not commonly found in avian tuberculosis, was the frequent involvement of the lungs and serous membranes.

In Table I are listed the organs in which macroscopic lesions were observed at autopsy, and it will be seen that the liver was found to be affected in 22 instances (75·8 per cent.), while the lungs were next in importance, being affected 20 times (68·9 per cent.). The air sacs were also involved in 20 instances, or 68·9 per cent. of the ducks examined, the spleen 13 times (44·3 per cent.), and the peritoneum 9 times (31·0 per cent.). Altogether the respiratory system was involved in 22 of the 29 affected ducks. The distribution of the lesions is illustrated graphically in Table II.

In only three instances were the liver and spleen alone affected, as is commonly found in this disease in the fowl. Duck No. 353 was peculiar in that macroscopic lesions were found only in the clavicular air sacs and no lesions were observed elsewhere in the body, while ducks Nos. 76 and 10 were apparently in the very early stages of the disease and macroscopically only discrete small lesions were found in the spleen and liver respectively.

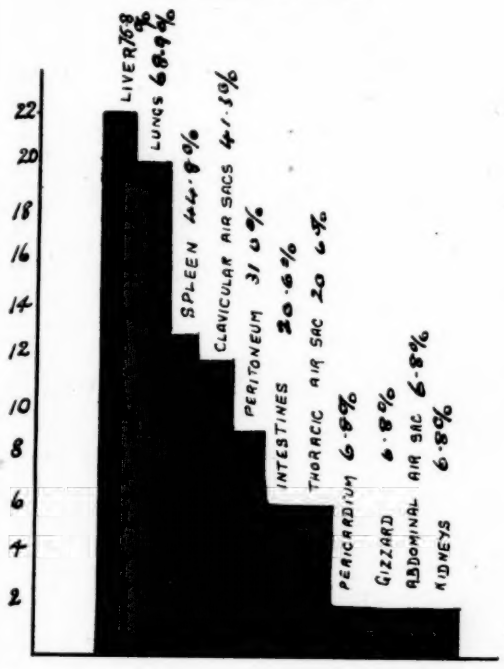
The macroscopic appearance of the lesions varied according to the extent of generalisation of infection and the organs involved. Lesions in the liver and spleen, when present, showed little difference macroscopically, to those found in the same organs in the fowl; but in many cases there was a greater tendency for the tubercles to coalesce into large diffuse areas of caseation rather than to remain as the typical discrete nodules found studding the fowl's liver and spleen. The organs were more or less enlarged, depending on the extent of infection. The liver showed a tendency to become greenish-bronze in colour, with a hard leathery texture. The tubercles occurred as caseous nodules varying in size from that of a pin's head to that of a pea, and as in the fowl, could be easily shelled out of the surrounding tissue. As already stated, there was a tendency for the nodules in the liver to coalesce into areas of greyish caseation, often green at the edges and as

Table I: List of Organs in which Macroscopic Lesions Observed at Autopsy

Duck No.	Liver	Spleen	Clavicular air sacs	Lungs	Thoracic air sacs	Pericardium	Abdo air sacs	Intestines	Gizzard	Peritoneum	Kidney
315 ...	+	+	—	—	—	—	—	—	—	—	—
76 ...		+	—	—	—	—	—	—	—	—	—
406 ...	+	—	—	—	—	—	—	—	+	+	—
402 ...	—	—	+	+	+	—	—	—	—	—	—
631 ...	+	+	—	—	—	—	—	—	—	—	—
346 ...	+	+	+	+	—	+	—	+	+	+	—
353 ...	—	—	+	—	—	—	—	—	—	—	—
63 ...	+	+	—	+	+	—	+	—	—	—	—
395 ...	+	+	+	+	+	—	—	—	—	—	—
540 ...	+	+	+	+	—	—	—	—	—	+	—
223 ...	+	—	—	+	—	—	—	—	—	—	—
820 ...	+	+	+	+	—	—	—	+	—	—	—
770 ...	—	—	+	+	—	—	—	—	—	—	—
809 ...	+	—	—	+	—	—	—	—	—	—	—
607 ...	+	+	+	+	—	—	—	—	—	+	—
54 ...	+	+	—	+	—	—	+	—	—	—	—
280 ...	+	+	+	+	+	—	—	+	—	+	—
900 ...	—	—	+	+	+	—	—	—	—	—	—
262 ...	+	+	+	+	—	—	—	—	—	—	—
960 ...	+	—	—	+	—	—	—	—	—	+	—
295 ...	+	—	+	+	—	—	—	—	—	—	+
640 ...	+	—	—	+	—	—	—	+	—	+	—
911 ...	+	—	—	—	—	—	—	—	—	—	—
815 ...	—	—	—	—	+	—	—	—	—	+	—
689 ...	—	—	—	+	—	—	—	+	—	+	—
459 ...	+	—	—	+	—	—	—	—	—	—	—
49 ...	+	—	—	+	—	+	—	+	—	—	+
10 ...	+	—	—	—	—	—	—	—	—	—	—
234 ...	+	+	—	—	—	—	—	—	—	—	—
Total 29	22	13	12	20	6	2	2	6	2	9	2
Percentage 25·8	75·8	44·8	41·3	68·9	20·6	6·8	6·8	20·6	6·8	31·0	6·8

(+ indicates that acid-alcohol-fast bacilli were demonstrated in smears)

TABLE II
DISTRIBUTION OF LESIONS



large as 1 inch in diameter. In a few cases when the liver showed this enlarged "cirrhotic-like" appearance, there was an associated ascites, as much as a half to one pint of fluid being present in the peritoneal cavity. In two instances (ducks 631 and 63), although lesions were present in other organs, no macroscopic lesions could be found in the spleen; but smears demonstrated the presence of large numbers of acid-alcohol-fast bacilli.

The lesions on serous membranes, pleura and peritoneum, and in the axillary region of the thorax, were most interesting as they simulated on a miniature scale the grape-like clusters of tubercles which are a feature of the disease in the bovine. When lesions were present in the clavicular and axillary air sacs, large masses, or clusters of grape-like tubercles were found, varying in colour from greyish to yellow. In some instances it was difficult to differentiate the tubercles macroscopically from neoplasms, but appropriately stained films of crushed tubercles readily demonstrated the acid-alcohol-fast bacilli, usually in enormous numbers.

When generalisation had reached the lung tissue, the lesions generally took the form of large caseous masses of typical appearance, frequently with necrotic cavitation in the centre of the lesions, and in some instances of extensive infection, little normal lung tissue remained. In other cases the infection was typically miliary.

On the peritoneum early lesions showed only as a slight roughening of the surface or as small tubercles unevenly distributed over the whole membrane. Older lesions took the form of definite tubercles massed together in grape-like bunches. No obvious lesions were observed affecting either the bones or musculature even when generalisation had occurred; but no detailed examination was carried out to confirm this. Similarly no tuberculous lesions of the ovary were satisfactorily demonstrated, but as this organ was required for other purposes, no special examination could be made.

To illustrate more clearly the macroscopic appearance of infected ducks at *post-mortem* examination, the following notes of two representative specimens are given.

DUCK No. 346. Killed. Extremely poor condition.

Liver: Enlarged four to five times normal size, green in colour and studded throughout with caseous yellow nodules varying in size from that of a pinhead to that of a pea.

Spleen: Enlarged three to four times normal size with multiple similar lesions.

Intestines: Typical nodules in walls of intestines.

Peritoneum: Whole of peritoneum studded with small yellow nodules and grape-like clusters of nodules, all about the size of a small pea.

Lungs: Multiple small caseous yellow lesions throughout the tissue of both lungs extending around the bronchi and trachea, and with tubercles on pleura and pericardium.

Air Sacs: Large grape-like masses of tubercles, similar to those in the abdomen, completely filling the thoracic and interclavicular air sacs.

Large numbers of acid-alcohol fast bacilli in smears from all lesions.

DUCK No. 63. Died in poor condition.

Liver: *Whole* organ enlarged to five to six times normal size, particularly the right lobe. Miliary pin-point foci of caseation, the organ becoming leucaemic in appearance. Two large areas of coalesced lesions present in left lobe.

Spleen: Dark in colour, normal size and no macroscopic lesions.

Intestines: No lesions of tuberculosis in intestines or gizzard. Owing to the gross enlargement of the liver and left abdominal air sac there was atrophy of these organs and displacement.

Lungs: Large caseous and necrotic mass involving two-thirds of left lung and extending backwards to involve left abdominal air sac. Walls of air sac thickened to form a lesion extending to size of a grapefruit and containing ¾ to 1 pint of dark green thick viscid fluid.

Smears of liver and lung lesions and from walls of air sacs showed large number of acid-alcohol-fast bacilli.

Histological examinations of sections from affected organs showed no marked differences from lesions of tuberculosis in the fowl. In smears from the lesions stained by Ziehl-Neelsen's or Pappenheim's methods, acid-alcohol-fast bacilli were usually present in enormous numbers. In some cases the smears were suggestive of smears from cultures, in that nothing but acid-alcohol-fast bacilli were present on the slide. The organisms closely resembled, in morphology and arrangement, those found in tuberculosis of the fowl, but showed a marked tendency to granular staining or beading; in fact, in some smears they resembled diphtheroid bacilli.

These autopsy findings are in agreement with those described by Feldman as occurring in the duck, and this author also draws attention to the greater tendency for lesions to occur in the lungs and serous membranes and describes the occurrence of miliary tubercles in the liver and spleen. Cavitation in the lungs was also observed and the enormous numbers of acid-alcohol-fast bacilli in the lesions noted.

Bacteriology

Material from the livers and spleens of ducks Nos. 346, 280 and 820 was seeded on to tubes containing Dorset's egg medium and glycerine egg medium. Material from bone marrow of Duck No. 346 was also plated on to tubes of culture media. Initial growth on these media at 38·5° C. was slow. After six weeks' incubation, isolated colonies with depressed crater-like centres were observed, the organism showing preference for the glycerine medium.

Smears from this growth stained by Ziehl-Neelsen's method showed acid-alcohol-fast rod-shaped organisms irregularly stained. Filamentous forms also staining acid fast were observed.

Continued sub-culture resulted in more confluent growth though this was not so luxuriant as is commonly experienced with the avian type mycobacteria.

Owing to the powdery nature of the growth on solid media, difficulties were encountered in attempting to obtain a surface pellicle on liquid media. After careful manipulation for some 12 months, and by subculturing on to fresh glycerine beef broth every 14 days, a fast-growing surface pellicle was obtained.

A tuberculin has now been prepared on synthetic medium from this duck strain for comparative testing.

Biological Transmission Experiments

The results of animal inoculations are given in Table III. It will be seen that while fowls showed a fairly high susceptibility to artificial infection with the organism under study in five to ten weeks, three out of four showing generalised tuberculosis, ducks were not easily infected. Only three of the 12 ducks under experiment died, and these, as in the case of

Table III

Animal	No.	Date	Inoculum	Route	Dose	Died or killed	Date	P.M. Lesions	Ziehl-Neelsen Smears	Results of Tuberculin Tests	
										Avian Tuberculin	Homologous Tuberc
Duck	2439	30.7.40	Culture ex Duck 346	I/V	1 c.c.	D	23.8.40	Liver and spleen enlarged. No discrete tubercles. Yersin type	+++	Not tested	Not te
,,	2438	,,	,, ,, 346	I/P	1 c.c.	D	31.8.40	Do. do. ...	+++	,,	,,
,,	2442	,,	,, ,, 346	I/M	1 c.c.	K	30.12.40	Multiple tubercles of kidneys. No other lesions	+++	,,	,,
,,	2437	,,	,, ,, 346	I/M	1 c.c.	K	,,	Small tubercle of peritoneum	++	,,	,,
,,	2440	31.12.40	Kidney emulsion ex duck 2442	I/V	1·5 c.c.	K	17.5.41	No lesions found ...	—	Negative	Negat
,,	2441	,,	,, ,, ,, 2442	I/P	1·5 c.c.	D	29.1.41	Liver and spleen grossly enlarged. Yersin type	+++	Not tested	Not te
,,	2963	,,	,, ,, ,, 2442	I/P	1·5 c.c.	K	25.5.41	No lesions found ...	—	Negative	Negat
,,	2964	,,	,, ,, ,, 2442	I/V	1·5 c.c.	K	17.5.41	No lesions found ...	—	Negative	Negat
,,	2962	,,	Culture ex Duck 820	I/P	2·0 c.c.	K	20.5.41	No lesions found ...	—	Negative	Negat
,,	2960	,,	,, ,, 820	I/V	2·0 c.c.	K	,,	Multiple tubercles of spleen—few scattered tubercles liver ...	+++	Negative	Negat
,,	2959	,,	,, ,, 820	Fed	5 c.c.	K	,,	Few small tubercles base of intestinal wall ...	+++	Negative	Negat
,,	2957	,,	,, ,, 820	Fed	5 c.c.	K	,,	No lesions	—	Negative	Negat
•Fowl	2435	30.7.40	Culture ex Duck 346	I/P	1 c.c.	D	30.8.40	Liver and spleen enlarged. No discrete tubercles. Yersin type	+++	Not tested	Not t
,,	2436	,,	,, ,, 346	I/M	1 c.c.	D	12.9.40	Do. do. ...	+++	Not tested	Not t
,,	2965	31.12.40	Kidney Emulsion ex Duck 2442	I/V	1 c.c.	K	18.3.41	Miliary tubercles of liver, spleen and lungs ...	+++	Positive	Not t
,,	2966	,,	,, ,, ,, 2442	I/M	1 c.c.	K	,,	No lesions found ...	—	Negative	Not t
Rabbit	A	30.7.40	Culture ex Duck 346	I/P	1 c.c.	K	25.11.40	No lesions found ...	—	Not tested	Not t
,,	B	,,	,, ,, 346	I/M	1 c.c.	K	31.12.40	No lesions found ...	—	Not tested	Not t
,,	1	31.12.40	,, ,, 820	I/P	1 c.c.	K	18.3.41	No lesions found ...	—	Negative	Not t
,,	2	,,	,, ,, 820	I/M	1 c.c.	K	,,	No lesions found ...	—	Negative	Not t
,,	3	,,	Kidney emulsion ex Duck 2442	I/V	1 c.c.	D	24.1.41	Liver and spleen enlarged. No discrete tubercles. Yersin type	+++	Not tested	Not t
,,	4	,,	,, ,, ,, 2442	S/C	1 c.c.	K	18.3.41	No lesions found ...	—	Negative	Not t
Cavy	1	30.7.40	Culture ex Duck 346	S/C	1 c.c.	D	22.10.40	Local abscess containing thick creamy pus at inoculation site ...	+++	Positive	Not t
,,	2	,,	,, ,, 346	S/C	1 c.c.	D	22.10.40	Do. do. ...	+++	Positive	Not t
,,	3	31.12.40	,, ,, 820	I/P	1 c.c.	K	18.3.41	No lesions found ...	—	Suspicious	Not t
,,	4	,,	,, ,, 480	S/C	1 c.c.	D	22.2.41	No lesions found ...	—	Suspicious	Not t
,,	5	,,	Kidney Emulsion ex Duck 2442	S/C	1 c.c.	K	18.3.41	Abscess with thick creamy pus at inoculation site	+++	Positive	Not t
,,	6	,,	,, ,, ,, 2442	I/P	1 c.c.	K	,,	Do. of lower bowel and abdominal wall ...	+++	Positive	Not t

• All fowls previously negative to the tuberculin test

the fowls, showed complete generalisation of the disease in septicaemic form. No discrete tubercles were to be observed, but smears from the cut surface of the liver and spleen stained by the Ziehl-Neelsen method showed enormous numbers of acid-alcohol fast bacilli present. Of the remaining nine ducks, four showed only small localised tubercles when killed for *post-mortem* examination three to five months after inoculation, while five ducks remained healthy, and on autopsy no lesions of tuberculosis could be found.

Both rabbits and guinea-pigs were fairly resistant to artificial infection. Of the six rabbits inoculated only one developed tuberculosis. This was rather peculiar in that in this case infection occurred in a septicaemic form and the animal died in 24 days. Two of the six guinea-pigs were unaffected while the remaining four only showed local lesions at the site of inoculation.

In Table IV the pathogenicity for laboratory animals of the organism under study is compared with that of the typical avian and bovine strains of mycobacterium.

Table IV.

	Duck Strain	Avian	Bovine
Fowls	Very susceptible	Very susceptible	Resistant
Ducks	Fairly resistant	Fairly resistant	?
Rabbits	Resistant	Susceptible	Susceptible
Guinea-pigs	Resistant	Resistant	Susceptible

The resistance of rabbits to artificial infection with the organism recovered from ducks would suggest that it is an atypical form of the avian strain, and this agrees with the findings of Hinshaw.

Three of the rabbits and all the guinea-pigs were tested with both avian and bovine tuberculin (Weybridge) about six weeks after inoculation. None of the rabbits reacted to either test, but four of the guinea-pigs gave good positive reactions to avian tuberculin, but were negative to bovine tuberculin, indicating that the infection was of avian type.

Seven of the artificially infected ducks were tested with avian tuberculin (Weybridge) intradermally in the skin of the back of the neck, but no reactions were observed at the 24th or 48th hour. In view of these results, and the negative findings obtained with tests carried out with avian tuberculin on naturally infected ducks, it was decided to try the effect of testing with an homologous tuberculin. A tuberculin was prepared on synthetic media from the organism obtained from duck 346. The same seven ducks were tested and, approximately two months later, by the intradermal inoculation of 0·1 c.c. of the tuberculin in the skin of the neck. Again no reactions were observed at the 24th or 48th hour, but unfortunately on *post-mortem* examination five of the ducks showed no lesions of tuberculosis and the remaining two showed only localised infection, so that no reliable conclusions can be made as to the value of this test.

TUBERCULIN TESTING OF DUCKS

The tuberculin test employed on the domesticated fowl has been shown to be a very reliable method of detecting the presence of tuberculosis in the fowl, and many workers have recorded their detailed findings of tests carried out on large numbers of birds, Spears and Dobson (1941). The wattle of the fowl has been selected as the most suitable site of inoculation, but in ducks, pheasants, pigeons and other birds which may require to be tested, this organ is either absent or extremely small.

In the past the exceedingly few recorded instances of tuberculosis in the duck have created possibly a false impression, as no records of tuberculin tests on a large scale on ducks have been published. This may be due to the fact that until a few years ago (with the exception of the duck fattening establishments) there were few large-scale duck farms in this country.

Certain workers have recorded the results of their efforts to find a suitable site for the tuberculin test, including the eye, the eyelid, skin of the neck, breast, wing and web of the foot. Craig and Davies (1937) reported the results of testing 15 ducks, using the web of the foot. They state, " It must be concluded that the tuberculin test as applied intradermically to the web of the duck's foot, is of no practical value in the diagnosis of tuberculosis." Downham and Venn (1938) reported that the skin of the neck is a suitable site for testing ducks for tuberculosis. These workers artificially infected six ducks with a suspension of avian tubercle bacilli obtained by grinding up the spleen of a fowl which was affected with acute generalised tuberculosis. Only two of these ducks appear to have been tested with tuberculin, and 48 hours later, positive reactions were found, the skin showing an oedematous swelling with an increased thickness. *Post-mortem* examination revealed lesions of tuberculosis. A further group of 60 ducks for export was tested; of these 59 gave completely negative reactions to the test, carried out on the skin of the neck. One duck gave a typical oedematous swelling with an increase in the thickness of the skin of approximately 5 × 7 mm.; but no report is given that this duck was killed or *post-mortem* lesions described.

It would appear, therefore, that these authors base their judgment of the value of the test on that carried out on two artificially infected ducks showing an oedematous swelling and in which lesions of tuberculosis were found on *post-mortem* examination.

Results of Tests Carried Out at Weybridge

The first tuberculin test was carried out on 85 of the 113 ducks brought to the laboratory. The skin of the neck was used as the site of inoculation, and two intradermal inoculations were made, one on the right side of the neck with Weybridge synthetic avian tuberculin, and one on the left side with Royal Veterinary College synthetic avian tuberculin. In both cases a dose of 0·1 c.c. was used.

When the birds were examined 24 hours later a very slight swelling and reddening of the skin was present in seven ducks; but in all the birds the skin was quite normal at the 48th hour after inoculation. The extent of the swelling was fairly equal on the right and left sides of the neck.

The *post-mortem* examination of these seven birds was not carried out until about two months later,

when only two ducks were found to be infected with tuberculosis. Nineteen of the birds which showed no change following the tuberculin test showed lesions of tuberculosis on *post-mortem* examination.

One month later the same group of 85 ducks was tested by instilling two drops of tuberculin (Weybridge synthetic avian) into the inner canthus of the right eye. The birds were examined at the 24th and 48th hours after inoculation, when the eyes were all found to be normal.

Many of the above ducks were re-tested a month later, employing various routes for the tuberculin test. Weybridge synthetic tuberculin was used in each test.

Twenty-two ducks were inoculated in the skin of the neck, and when examined 24 hours later, ten showed a slight swelling, which disappeared before the 48th hour. It was found at the *post-mortem* examination that three ducks had lesions of tuberculosis and the remaining seven were healthy.

Sixteen ducks were tested by instilling two drops of tuberculin into the inner canthus of the eye. When examined 24 and 48 hours later the eyes were normal.

A *post-mortem* examination was carried out on these ducks and three were found to have lesions of tuberculosis, the remainder were healthy.

Fourteen ducks were tested using the line of junction of the skin and the mucous membrane of the cloaca. This is an excellent site for obtaining a true intradermal inoculation. The injection of 0·1 c.c. of tuberculin raised a small pea-like swelling. When examined at the 24th hour after inoculation three birds showed a diffuse swelling, which persisted quite markedly until the 48th hour in two of them. These birds were killed, but only one of the persistent reactors was found to be infected with tuberculosis.

Three other ducks out of the group of 14 were found at *post-mortem* examination to be infected with tuberculosis and they had given an entirely negative reaction to the tuberculin test.

Table V

Table showing the result of tuberculin testing 85 ducks, by various routes, using Weybridge avian synthetic tuberculin

No. of ducks tested	Route	No. showing negative reaction at 24th hour	No. showing slight reaction at 24th hour and P.M. negative	No. showing slight reaction at 24th hour. P.M. positive	No. showing no reaction and P.M. positive	No. showing no reaction and P.M. negative
85	I.D. neck ...	78	5	2	19	52
85	Intraocular ...	85	—	—	19	66
22	I.D. neck ...	12	7	3	—	12
16	Intraocular ...	16	—	—	3	13
14	I.D. cloacal fold	11	2	1	3	8

The reactions following the tuberculin tests were very small indeed and could not be described as well-defined oedematous swellings as quoted by Downham and Venn, 1938. In no case was there an increase in thickness of the skin of more than 2 mm. It can only be concluded from the records presented, that the tuberculin test on ducks by these varying routes, is of no practical value in the diagnosis of tuberculosis.

Summary

1. On *post-mortem* examinations carried out on a group of 113 ducks, lesions of tuberculosis were found in 29, or 25·8 per cent.

2. One of the most striking features of the infection was the frequent involvement of the lungs, air sacs, and serous membranes. The lesions on serous membranes and in the axillary region of the thorax appeared as grape-like clusters of tubercles, resembling the bovine form of the disease on a miniature scale.

3. Smears from tuberculous lesions stained by the Ziehl-Neelsen method showed acid-alcohol-fast bacilli, which showed a tendency to granular staining or beading, to be present in enormous numbers.

4. Primary cultures grew slowly on Dorset egg and glycerine egg media, the organism showing a preference for the glycerine medium. The growth obtained after repeated subculture was not so luxuriant as that obtained with normal avian type mycobacterium.

5. The resistance of rabbits to artificial infection with the organism recovered from these ducks would suggest that it is an atypical form of the avian strain of mycobacterium.

6. The tuberculin test carried out intradermally in the skin of the neck, in the cloaca, and intraocularly, with synthetic avian tuberculin was not of value in the diagnosis of tuberculosis.

Conclusions

The lesions found on *post-mortem* examination of a group of tuberculous ducks, the cultural characteristics of the organism recovered, and biological transmission experiments indicate that the infection was due to an atypical form of the avian mycobacterium. Testing with avian synthetic tuberculin by various routes was of no value.

References

[1] Chretien, A., Germain and Raymond. (1923.) *Rev. Tuberc., Paris.* **4**. 25-65.
[2] Craig, J. F., and Davies, G. O. (1937.) *Vet. Rec.* **49**. 29.
[3] Downham, K. D., and Venn, J. (1938.) *Vet. Rec.* **50**. 431.
[4] Eber, A. (1924, 1925.) *Z. InfektKr.* **25**. 145-175; **27**. 1-19.
[5] Feldman, W. H. *Avian Tuberculosis Infections.* Baillière, Tindall & Cox, London, 1938.
[6] Garside, J. S., and Gordon, R. F. (1940.) *J. comp. Path.* **53**. 80-89.
[7] Hinshaw, W. R. (1933.) *J. Amer. vet. med. Ass.* 82. N.S. 35. 111-113.
[8] Klimmer, M. (1930.) *Berl. tierärztl. Wschr.* **46**. 702-710.
[9] Laenkholm, W. Quoted by Feldman.
[10] Schaaf, J. (1930.) *Berl. tierärztl. Wschr.* **48**. 350-352.
[11] Schlegel, M. Quoted by Feldman.
[12] Spears, H., and Dobson, N. (1941.) *Vet. Rec.* **53**. 365-370.

THE VETERINARY RECORD

October 4th, 1941.

NEW PERSPECTIVES IN VETERINARY PRACTICE

MR. PAUL CROSFIELD'S letter in this issue gives expression to certain thoughts which at the present time are steadily gaining shape in the minds of many men in all classes, and in all vocations throughout the world. These thoughts in a general way emanate forcibly from reflections upon the cosmic disturbances now afflicting the human race. Great changes in human ideas have taken place resulting in perspectives upon current problems widely different from those traditionally held. There is now an abundant and thoughtful literature growing around this subject. It had its beginnings before the present war; indeed, the whole rationale of the present totalitarian systems of government dominating large masses of human population can be conceived, it has been alleged, as huge social experiments replacing the decadent systems which prevailed before the last war. The impact of war has proved the weakness of some of the systems which survived the last war. At the present moment, the great conflict raging in Eastern Europe may be regarded as a test of the relative strength of two new systems. It will sooner or later become the turn of our older civilisation, conceived on the democratic principle—with all its inherent tendencies to decay with the lapse of time like all other human institutions—to prove that it is not outworn, or at any rate to prove that it can readjust itself to survive against the impact of the newer social systems that are striving for ascendancy.

In essence, the urge towards these convulsive changes arises from the powers placed in the hands of rulers and peoples by the exertions of the scientific mind. And science, in the form of the older sciences of chemistry and physics, has fashioned not only vast changes in the implements of war and the methods of using them, but also in the understanding of the human mind. Genuine progress must be planned on strictly scientific principles, that is, essentially upon a system of enunciating sound working hypotheses and testing them out experimentally, and in any progressive social system, this outlook must become one that has the full authority of the State. The liberty of the individual to conceive hypotheses must remain untrammelled and the ability of the State to work them and protect the individual in his enterprises if such be beneficent must be supreme.

It has been necessary to say this by way of preamble to the matters of domestic concern that are now vexing the minds of several members of our profession, as is evident from the tone of letters recently in our correspondence columns. Before the war, many individuals, both inside and outside our profession, felt that all was not well with our educational system, despite the coherence imparted to it by the control effected by our Governing Body. Again, soon after the outbreak of the present war certain active men in the profession realised that a large bulk of its members were not in *real* contact with much animal disease besetting the agriculturist and were not in a position to apply either the full weight of their personal skill or the resources now forthcoming from the advances of science to its control. It was sincerely felt that something had to be done, and, as has been said, whatever was first attempted must be conceived as a working hypothesis out of the best available expert evidence, and then launched, with the approval of the State, as a well planned co-ordinated experiment. It is in this light that the Survey Scheme must be regarded, both in respect of its short-term and long-term policies. Otherwise, unless something of the kind is promulgated, it is easy to foresee that the problems will be neglected, exploited by charlatanism, or taken up by a medley of experts in many branches of science and with no coherence in training upon the single problem of the maintenance of animal health. Such a fate must be deemed unsatisfactory to the agriculturist and would ultimately spell the doom of the veterinary profession itself.

What is to become of the general practitioner in these developments? The correspondence which started with a letter from Mr. Shipley in our columns a few weeks ago has evoked a good deal of sympathy because of the suggested plight of the practitioner which it alleged to be due to the usurpation of too much of his functions by the State. Some critics with a more hopeful view of general practice have not found prevalent similar cogent reasons for dismay. The situation is one, however, which needs to be carefully watched, as it will be, by our Association. Changes in the outlook of general practice are now inevitable. We need not be dismayed by such a prospect but the profession must help to mould these changes and assist in their proper development. Who would have thought that with the immense changes wrought by the virtual disappearance of the horse, the profession was destined to survive as an even more numerous and virile body with immeasureably greater opportunities for service? In the main this has resulted from advances in scientific knowledge upon the problems affecting health and disease in all the domestic animals. It is at present hard to tell whether the successful working of the Survey Scheme and other co-ordinated forms of Government control will result in some kind of nationally co-ordinated veterinary profession embracing the Animal Health Division of the Ministry of Agriculture, the municipal veterinary officers, the veterinary laboratories and the veterinary practitioners organised to carry out the truly national tasks of maintaining the health of the country's livestock and controlling its disease and of ensuring the wholesomeness and high quality of foods of animal origin destined for human consumption. Not forgetting the heavy responsibility of the Royal College and of the teaching schools, the prospects

will be determined largely by members of the profession themselves and above all by the manner in which they equip and apply themselves to ensure the success of the scheme. It is a solemn duty of those elected to representative positions in the Councils of the profession to ensure that the zeal displayed by its members in the attainment of that end is not unrequited.

RATIONING OF ANIMAL FOOD

In a recent announcement, the Ministry of Agriculture states that the arrangements for rationing animal feedingstuffs during the winter period commencing October 1st assume that most farmers will by then have become largely self-supporting as regards food for their livestock. Farmers will be allowed to use for this purpose any grain they have grown, except millable wheat. Allowances of feedingstuffs from the national "pool" will normally be confined to dairy cows and milch goats (according to milk yield), calves and pigs and poultry in certain cases. To attract off the farm sufficient oats to meet essential needs, especially for human food and for feeding urban and colliery horses, "bonus" coupons will be available for a limited period to farmers who sell, or make agreements to sell, oats to approved buyers. Similar arrangements will apply to sales of dredge corn. Some farmers may find themselves at a disadvantage because they have grown wheat in the national interest instead of growing feedingstuffs. To overcome their difficulties, County War Agricultural Executive Committees will have a small reserve of coupons for issue, at their discretion, to such farmers who need assistance. Issues from the reserve may also be allowed to needy growers of other crops for human consumption. Coupons in respect of pigs and poultry for October will be issued by the Committees almost immediately, together with a leaflet explaining the scheme, forms of registration with distributors and application forms for rations for dairy cows, calves and goats.

* * * * *

THE EXTRA HEADLIGHT

"The relaxation in motor-car lighting restrictions permitting the use of two shielded headlights instead of one is only an experiment," observes the Aeronautical Correspondent of *The Times*, and continues: "For the best air defence the authorities would like a complete black-out, but this is impossible, so that the black-out which is enforced must be a compromise. Complete darkness would bring the life of the country to a standstill every night, and impede the war effort as effectively as heavy bombing, but on the other hand too much light has been shown to be a guide for raiders.

"The degree of darkness most suitable in winter time has been studied by Ministry of Home Security experts, and the new regulation is the result. The Prime Minister and other members of the Cabinet are strong supporters of having as much light as possible, consistent with security. It is believed that the use of a second headlight will relieve the strain on lorry drivers and others who must travel by night. But if the added light proves a source of danger the old regulation, permitting only one screened headlight, will be re-enforced."

* * * * *

Erratum.—Annotation "Trichiniasis," *Vet. Rec.* **53**. 571, col. 1, para. 1, l. 14, *for* 15° C. *read* —15° C. in the sentence (quoting Beeson), "He further states that the larvae will live many weeks in meat kept at 0° C., but that 15° C. for 20 days will kill them."

* * * * *

The Minister of Food has made an Order which prescribes maximum prices for meat sold for feeding animals and otherwise regulates the trade in this commodity.

CLINICAL COMMUNICATION

Mustard Cake Poisoning *

A. H. WATSON, M.R.C.V.S.
Thornbury, Bradford

On August 5th last year I was called early in the morning by a client to attend his cattle which he stated had been poisoned. He informed me that two had died during the night. I attended at 10.0 a.m. with Mr. R. Hayes, M.R.C.V.S., and found two cows dead, one *in extremis* and six ailing. The history given to us was that on the previous morning ten milking cows had been fed on mustard cake which had been delivered the evening before. Four laying-off cows were not given this cake and one of the ten refused it; these five cows showed no symptoms. After being milked all the animals were turned out to grass where the owner in the afternoon found the nine ailing cows showing distressing symptoms: uneasiness, kicking at the abdomen, lying down for a few minutes and then rising. He removed them at once to the mistle where the acute pains appeared to subside. The milk yield of all the cows dropped at once. No animals on the farm were affected except those fed with the mustard cake.

Having come to the conclusion that the cows were suffering from poisoning, two samples of the cake were taken from the opened bag. One sample was taken by the owner to the forage merchants and the other I delivered to Mr. Hignett at the Department of Agriculture, Leeds University, for examination.

I held *post-mortem* examinations on the three cows which died, finding acute gastro-enteritis and an extensive yellow gelatinous exudate on the outside of the stomachs, which in my opinion confirmed the diagnosis of poisoning.

On August 7th I again attended with Mr. Hayes and this time Mr. W. Crawford was present on behalf of the forage merchants. After going into the history, etc., Mr. Crawford agreed that the cause of the trouble was, in his opinion, the mustard cake. Meanwhile the surviving cattle were improving, and Mr. Hayes told me later that they all recovered.

On August 8th the following report was received from Mr. Hignett:—

> "Microscopical examination of the sample by Miss D. M. Turner reveals the presence of a high proportion of seeds of black mustard (*Sinapis niger*). These seeds contain a compound known as sinigrin, one of the mustard oil glucosides, which on hydrolysis yields glucose, potassium hydrogen sulphate and allyl isothiocyanate. This latter is poisonous and has doubtless been the cause of the trouble in this case."

I also sent to Dr. Tom Hare some of the contents of the stomachs from two cows and some cake. On August 16th I received the following report from him:—

> "Upon chemical analysis of the contents of the rumen and abomasum from each of the two cows I found traces of a pungent volatile oil, the precise identification of which was impossible owing to

* Reported to the Yorkshire Veterinary Medical Society, at the meeting held in Leeds on May 23rd, 1941.

ABSTRACTS

[GRAMICIDIN, NOVOXIL AND ACRIFLAVINE FOR THE TREATMENT OF THE CHRONIC FORM OF STREPTOCOCCIC MASTITIS. Little, R. B., Dubos, R. J., and Hotchkiss, R. D. (1941.) *J. Amer. vet. med. Ass.* 189-199.]

In the hope of finding some more satisfactory means of treating chronic mastitis due to *S. agalactiae* than those already in vogue, the authors have experimented with several new products.

Gramicidin is the alcohol-soluble fraction separated from cultures of a sporulating soil bacillus which has been shown to possess marked bactericidal activity quite distinct from that of a bacteriophage. This substance was used in amounts varying from 60 to 240 mg. dissolved in alcohol and mixed with distilled water.

After drawing off the milk the galactophorous sinus is flushed out with a little of the solution and then the remainder of the fluid injected under steady pressure into the quarter and left for eight to nine hours after gently massaging. The same substance, when mixed with oils such as almond or olive oil, was found to be less irritant.

The second substance, Novoxil, is a 5 to 10 per cent. preparation of silver oxide in a mineral oil. It is injected in 10 to 15 c.c. amounts. When in contact with the tissues silver hydroxide is said to be formed.

The acriflavine was used in a dilution of 1 : 4,000.

Although gramicidin in oil gave the best results, *S. agalactiae* being eliminated from 21 out of 32 quarters treated (65 per cent.), and in eleven of these after one injection, most of the cows referred to had several treatments with different preparations and not all were cured.

The results, which lead the authors to support the prevalent opinion that latent or mild cases respond best, do not offer hopes of any marked improvement in therapeutics just yet. It is possible, however, that when more experience has been gained with gramicidin more success will be achieved.

Several points of special interest are raised in this article. The authors support Steck's contention that in the majority of cases of chronic mastitis infection is localised to the milk cistern, bacterial foci being present in recesses or pockets in the cistern wall and being very difficult to dislodge ; further, that quarters with patent teat-sphincters are comparatively common and are more readily re-infected than udders with normal teats.

N. S. B.

---

the presence of other volatile substances, but was suggestive of mustard oil. Upon analysis of the sample of cake, mustard oil was detected, approximately 0·2 grammes of allyl isothiocyanate per 100 grammes of cake being found. In view of these results and of your *post-mortem* findings and clinical history I am of the opinion that mustard oil poisoning was the cause of death."

I may say, in conclusion, that the farmer received compensation about a month ago.

[STUDIES ON THE MECHANISM OF IMMUNITY IN TUBERCULOSIS. Lurie, M. B. (1939.) *J. Exp. Med.* **69**. 555-577. (2 text figs., 3 tables, 17 refs, 17 figs. on 3 plates.]

The experiments of Rich and co-workers (*Bull. Johns Hopkins Hospital*, **44**, 273, etc.) which cast doubt upon the rôle of allergy in immunity to tuberculosis, have been repeated by the author. Rich employed subcutaneous injections of melted agar impregnated with tubercle bacilli, and trypan blue into rabbits. The author used guinea-pigs since their reactions more closely resemble those of man. The technique employed was the same as that used by Rich. A number of similarities between reactions in guinea-pigs and rabbits was noted. In general the fate of bacilli of reinfection at the point of entry and in metastasis and the associated reactions were identical. In the guinea-pig, however, tubercle bacilli of reinfection were more effectively fixed at the portal of entry, as were trypan blue and agar particles. At the site of inoculation precipitins accumulate in higher concentrations in guinea-pigs. The relative capabilities of the two species for fixing bacilli depend on the character of the inflammation resulting from reinfection. The tissues of the guinea-pig are much more sensitive than the rabbit and hence are grossly injured by the tubercle bacillus, which causes a local thrombosis of the lymphatics. The tissues of the rabbit, however, are less sensitive and less injured and the corresponding lymphatics remain open. In primary infections of both species of experimental animals the tubercle bacilli are destroyed most extensively at the portal of entry. At this time they are less effectively retained in the nearest metastatic focus. The serum of normal animals supports the growth of the tubercle bacillus *in vivo*. That of tuberculous animals is bacteriostatic for the organism.

During the work tubercle bacilli were often observed multiplying by subdivision into non-acid-fast granules, from which acid-fast rods later arose.

D. D. O.

* * * * *

[CAESARIAN SECTION IN THE BOVINE. Frank, E. R. (1940.) *N. Amer. Vet.* **21**. 546.]

A departure from the orthodox is described in that the incision is made on the right side of the abdominal mid-line, half way between the median raphé and the subcutanous abdominal vein. Epidural anaesthesia is employed and the animal cast on its left side. The site is prepared in the usual way, and the hind limb rotated to produce dorsal recumbency. The incision is made about 12 in. long, extending from the udder forwards. The omentum is either incised or pulled forwards. The pregnant horn is then brought to the mouth of the incision, thus preventing prolapse of the intestines. The cow is then returned to its side, and the uterus incised to deliver the foetus ; cotyledons are avoided in the incision. The placenta is removed if possible. The exposed uterus is then cleaned with sterile saline and closed with continuous Lembert gut sutures. Peritoneum and abdominal wall are also closed with gut, and finally the skin with tape mattress sutures. Pituitrin is recommended to promote involution.

This method facilities manipulation of the pregnant horn, the wound heals rapidly, and uterine fluids

cannot enter the abdomen. The main disadvantage appears to be the possible formation of a hernia.

G. V. L.

• • • • •

[PERACUTE ILLNESS IN CATTLE AFTER FEEDING ON THE FOLIAGE OF BEETROOTS. Hupka, E. (1940.) *Deuts. tierärtzl. Wschr.* **48.** 628-629.]

The foliage of the sugar beet and beetroot is known to be rich in digestible protein and starch equivalent and as such is a valuable food for cattle, but it contains also oxalic acid in large amount (8·2 grammes per kg. foliage). Oxalic acid is decomposed to some extent in the rumen and is formed into harmless calcium oxalate in the blood. If, however, large doses of such oxalic acid are given repeatedly in the diet the blood and bone calcium metabolism are seriously upset. Root foliage also increases the coagulation time of the blood about fivefold.

Two instances in which the giving of large amounts of beet tops of a sudden, at a time when grazing was poor and when beet was being harvested, had serious effects on cattle, are described. Seven cows out of 14 cows and heifers, given beet tops in the evening, appeared as if affected with milk fever the next morning. The temperature was subnormal, the pulse frequent and irregular and there was severe foul-smelling diarrhoea. Recovery followed the giving of a heart tonic and $CaCO_3 + MgCO_3$. In the second case, with similar circumstances, four head of cattle died. The *post-mortem* findings included rumeno-enteritis, petechiae on several serous membranes, uncoagulated blood, congestion of the lungs and spleen and signs of damage to the liver and kidneys.

J. E.

• • • • •

[THE *IN VITRO* CONVERSION OF INORGANIC NITROGEN TO PROTEIN BY MICROORGANISMS FROM THE COW'S RUMEN. Wegner, M. I., Booth, A. N., Bohstedt, G., and Hart, E. B. (1940.) *J. Dairy Sci.* **23.** 1123-1129.]

It was found that when urea was added to rumen contents, together with calcium carbonate, which maintained the *p*H in the region of 6·0, and the mixture incubated at 37° C., there was a decrease in inorganic nitrogen.

In a synthetic medium containing various salts plus corn molasses, commercial glucose or starch, but not cellulose, growth of rumenal organisms took place. The extent of the disappearance of inorganic nitrogen depended on the amount of carbohydrate present, but when casein was added urea nitrogen was not utilised, presumably because the bacterial cells used protein nitrogen in preference to inorganic nitrogen.

The urea nitrogen was first converted to ammonia nitrogen which was then utilised by the bacteria to produce protein nitrogen.

The buffering action of cows' saliva is recognised to be important in maintaining a normal *p*H in the rumen, but experiments indicated that it had little amylolytic activity. The amylolytic activity of rumen contents was, however, decidedly greater than that of the saliva and could probably account for the hydrolysis which must occur in the breakdown of starch and possibly other polysaccharides.

[It has already been shown that urea and other similar substances can replace half the dietary protein of cattle.] J. F.

[STUDIES ON SWINE INFLUENZA VIRUS. Scott, J. P. (1941.) *University of Pennsylvania Veterinary Extension Quarterly.* No. 83. 21.]

The intranasal instillation of S.I. virus, together with culture of *Haemophilus influenzae*, produced symptoms of stupor, excitability and high fever after 24 to 48 hours in susceptible pigs; there was an increased respiratory rate occasionally developing into "thumps." This condition was transmitted by contact, but when normal pigs were placed in pens, used for the previous nine days to house infected pigs, they failed to develop the disease. The instillation of S.I. virus and cultures of *Pasteurella septica* produced a non-contagious form of swine influenza, but pigs which were latently infected with pasteurella organisms developed swine influenza when placed in contact with pigs which were carriers of the swine influenza virus.

The lesions encountered in outbreaks of swine influenza are variable but it has been shown that S.I. virus produces a progressive atelectasis with little or no congestion; influenza virus plus *H. influenzae* produces peribronchiolar pneumonia as well as atelectasis; and virus plus Pasteurella infection is associated with extensive catarrhal pneumonia and fibrinous pleuritis. This last condition is usually met when the pigs have been subjected to unfavourable hygienic conditions.

Phenol, in concentrations of 0·25 per cent., had little destructive action on the virus suspected in nutrient broth, but 0·1 per cent. formalin inactivated it in 15 minutes.

S.I. virus was passaged in chick embryos when it was found that after a certain number of passages, varying for different strains, the virus had lost its virulence for mice and pigs. The intranasal instillation of 20 c.c. of a suspension of this egg-passage virus produced sufficient immunity to protect against artificial infection 83 days later. Virus treated with formalin appeared to be equally potent as an immunising agent but S.I. virus obtained direct from swine lungs was never found to be of value as an immunising agent.

Hyper-immune serum had little or no influence on the course of swine influenza.

J. F.

• • • • •

[THE PRINCIPLE OF TISSUE AUTOLYSIS AND ITS POSSIBLE APPLICATION IN CANINE THERAPY. Emmel, M. W. (1941.) *J. Amer. vet. med. Ass.* **98.** 134.]

The author reviews existing knowledge regarding tissue autolysis which occurs when cells suffer any sort of injury. The condition can be induced experimentally, and if doses of the causal agent are not progressively greatly increased, immunity to tissue autolysis develops.

The writer has shown that in dogs and poultry repeated intravenous injection of freshly emulsified desiccated and autolysed homologous tissues produces tissue autolysis, and that considerable immunity develops where doses are not markedly progressively increased. In subsequent experiments non-immunised animals died on receiving massive doses of *S. enteritidis*, while those immune to tissue suspensions showed considerable resistance. He points out that normally the dose of toxic products resulting from surgical interference capable of causing systemic

reaction is very small. Animals could, however, be immunised to withstand surgical interference to a great degree. Moreover, the efficacy of blood transfusion could be greatly increased by immunisation of donors. He describes immunisation of such donors with liver tissue, by slow intravenous injection once weekly, commencing with 50 mg. and stepping up to a limit of about 200 mg. Immunity develops in about ten days after the last dose, and lasts about six months.

G. V. L.

REPORT

[**ASSAM.** Report of the Civil Veterinary Department for the year 1939-40. (Ghose, S. C.) Assam Government Press. Annas 14 or 1s. 4d.]

A comprehensive and interesting report recording considerable progress of activities. The staff was strengthened during the year by the appointment of 43 Veterinary Field Assistants, trained to assist in the work of vaccination, castration and first aid in minor diseases: this is an economical expansion of the department which should go far to meet the rapidly growing demand for veterinary service and relieve the more highly qualified staff. It is proposed to increase the establishment of Veterinary Assistant Surgeons and Field Veterinary Assistants in the immediate future.

Rinderpest was again very prevalent in the province during the year. The disease was dealt with energetically and vaccination with goat tissue vaccine gave encouraging results. There was some increase in mortality from haemorrhagic septicaemia and anthrax. The incidence of Johne's disease is causing some anxiety and is receiving special attention. Equine surra was again prevalent in one district. Cases received prompt and successful treatment. Disease investigation is being energetically pursued in several directions.

The Director is not satisfied with the existing system under which there is dual control of the District Veterinary Staff by the Veterinary Department and the Local Boards and he is strongly of opinion that his department should assume full control of livestock improvement in the province. The Government of Assam note with satisfaction the steady progress maintained by the department and pay tribute to the valuable services rendered by Rai Sahib S. G. Ghose, who is on the eve of retirement.

G. K. W.

PENICILLIN

Commenting on the findings of a team of workers at Oxford, as recorded in *The Lancet*, in regard to the potentialities of Penicillin, the bactericidal substance extracted from species of the mould *Penicillium*, *The Pharmaceutical Journal* states: "This substance is so effective against some bacteria that it will prevent growth when it is present in the amazingly low concentration of one in a million. What is even more important is that here, at last, is a bactericidal substance that is not reduced in efficiency by the presence of pus, serum or decomposition products of body proteins. It is, in fact, a substance such as bacteriologists have dreamed of for years—a bactericide that is without measurable toxic effect on living cells and tissues. This is one of the most amazing additions to the chemotherapy of infected wounds and is made at a time when chemotherapy is bidding fair to displace all other forms of treatment."

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Oct. 6th.—R.C.V.S. Committee Meetings, Royal Station Hotel, York.
Oct. 7th.—R.C.V.S. Committee Meetings, Royal Station Hotel, York.
Oct. 8th.—R.C.V.S. Council Meetings, Royal Station Hotel, York.
Oct. 10th.—Meeting of the Society of Veterinary Practitioners, at St. Albans, 2.30 p.m.
Oct. 16th.—Meeting of the Lincolnshire and District Division, N.V.M.A. at Lincoln, 2 p.m.

* * * * *

A.R.P. for Farm Animals

The veterinary officers and others assisting in the Rural Areas Scheme for dealing with casualties among farm stock arising from enemy action should not allow their local organisation of animal stewards and others to be disbanded. Notices recently issued by the Ministry of Food to farmers, and the approaches made to veterinary surgeons by certain slaughterhouse managers, should not be taken as signifying the end of the rural areas scheme. Negotiations are at present proceeding to clarify the position created by this recent action of the Ministry of Food, but meanwhile veterinary officers are asked to co-operate with the salvage services of the Ministry as in the past, the slaughterhouse managers being regarded as N.A.R.P.A.C. salvage officers and the organisation as a whole thereby maintained.

* * * * *

Proposed Society for Women Veterinarians

We would direct the attention of our women readers to the announcement, in our notices column, by two of their number. Acting under a sense of concern that women members of the profession should have organisation as a society, providing their own forum for the discussion of veterinary scientific—and, doubtless, political—affairs, they have called a meeting at Gordon Square for consideration of the project. We feel that their enterprise should be rewarded by a representative gathering to discuss their progressive proposal, and trust that it may be found that, from the now considerable number of women in Membership of the Royal College, sufficient support is forthcoming to inaugurate a society for which the signatories of the announcement are convinced there is not only a place but a real need.

* * * * *

PERSONAL

Birth.—Taylor.—At 9, Grosvenor Street, Edinburgh, on September 25th, 1941, to Edna (Bradley), wife of A. Wilson Taylor, M.R.C.V.S., a son (Michael).

* * * * *

The many friends of Mr. T. F. Stokes, M.R.C.V.S., D.V.S.M., Veterinary Inspector of the Ministry of Agriculture and Fisheries, stationed at Wakefield, will regret to hear of his continued sickness.

Six weeks ago he contracted undulant fever and after being seriously ill for the first few weeks, is now making good progress. He is at present in Parr Gate Isolation Hospital, Wakefield.

* * * * *

SCIENCE AND WORLD ORDER

A series of important conferences on science and world order arranged by the British Association was held from September 26th to 28th at the Royal Institution, Albemarle Street, W.1.

Papers were read by distinguished scientists from all over the world, and among the Chairmen were Mr. J. G. Winant, the American Ambassador, M. Maisky, the Soviet Ambassador, Dr. Benesh, Dr. Wellington Koo, the Chinese Ambassador, and Mr. H. G. Wells. Messages recorded by General Smuts and Professor Einstein were transmitted during the meetings, and the speakers included Lieutenant-General A. G. L. MacNaughton, Commander of the Canadian Corps, Mr. Herbert Morrison, Lord Samuel, Lord Hailey, Professor A. V. Hill, Dr. C. H. Waddington, Sir John Orr, Sir John Russell and Dr. J. S. Huxley.

In his introductory address, Sir Richard Gregory, the President, emphasised the international aspect of science and its possibilities, properly adapted, for the common weal. Scientists wanted to take an active part in the construction of a new framework of civilisation in which the full services of their discoveries were made available to improve conditions of life. In the commonwealth of science there were no social, racial, or geographical distinctions. The conference was called to seek a common understanding of what science could do for the betterment of the human race and authority to assist in the control of forces now used to degrade it.

Planned Food Policy

Sir John Orr advocated the adoption of a planned food policy which would bring within the reach of every person a diet completely adequate for health. There was no likelihood of a world glut of food either in our days or those of our children, he said, and stupid political measures which had been restricting food on the assumption that there would be a glut would have to be replaced by scientific measures which would ensure that food would be produced and distributed in accordance with the needs of the people.

The amount of food we should need to produce for any group of countries could be fairly accurately estimated. Therefore, a food policy could be arranged on a stable basis. Such a food policy could be made the spearhead for human welfare, for the expansion of agriculture and for the expansion of trade and economic stability. We had already begun to carry out these ideas. In Britain the war had forced us to adopt a food policy based on the needs of the people. He predicted that before the war ended there would be an extension of the rationing system to suit each type of industry. After the war Europe would be faced with the greatest catastrophe which had ever happened in history, and the Governments of the Allied nations should here and now appoint an international committee to work out a world-wide food policy based on human needs.

Sir John Russell discussed the problems that would arise after the war in restoring the "scorched earth" in Russia. The destruction of the soil, he said, was not likely to be serious. Russian scientists had developed soil classification and surveying to a high pitch. The reconstruction of agriculture, however, would be very difficult. Russian plant breeders had produced numerous varieties of crops specially suited to their different regions and it would be a tragedy if these varieties were lost.

Summarising the results of the conference, which, he said, might lead to London becoming the scientific centre of the world, Dr. Huxley said that there had been universal agreement impossible 20 years ago upon the practical as well as the theoretical importance of scientific discovery for implementing human needs and human aspirations. There had been insistence upon the necessity for the employment of science and scientific technique in the post-war period. But the science involved must be free and must be international.

Sir Richard Gregory said that several committeees were to be appointed by the council of the British Association to examine some of the main points that had been put forward and to prepare a considered statement upon them. He then announced the terms of a Charter of Scientific Principles which had been adopted by the Council of the British Association, in which the following are affirmed:—

Principles of the Fellowship of Science

1. Liberty to learn, opportunity to teach, and power to understand are necessary for the extension of knowledge, and we, as men of science, maintain that they cannot be sacrificed without degradation to human life.

2. Communities depend for their existence, their survival, and advancement on knowledge of themselves and of the properties of things in the world around them.

3. All nations and all classes of society have contributed to the knowledge and utilisation of natural resources, and to the understanding of the influence they exercise on human development.

4. The basic principles of science rely on independence combined with co-operation, and are influenced by the progressive needs of humanity.

5. Men of science are among the trustees of each generation's inheritance of natural knowledge. They are bound, therefore, to foster and increase that heritage by faithful guardianship and service to high ideals.

6. All groups of scientific workers are united in the Fellowship of the Commonwealth of Science, which has the world for its province and the discovery of truth as its highest aim.

7. The pursuit of scientific inquiry demands complete intellectual freedom and unrestricted international exchange of knowledge; and it can only flourish through the unfettered development of civilised life.

* * * * *

Weekly Wisdom

Science is not truly science unless fully free.—"The Times."

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

* * * * *

CONTROL OF ANIMAL DISEASE: THE SCHEME OF THE SURVEY COMMITTEE OF THE N.V.M.A.

To the Editor of the Veterinary Record

Sir,—In order to remove without delay a misapprehension which I believe exists I am writing you now.

I have been present at several meetings where this subject was discussed. On the first occasion we considered what was presumably the best scheme the sponsors could advance. Its main proposals were:—

1. That the scheme should be voluntary—"It is suggested that to commence with the scheme should be on a voluntary basis, any eligible stock-owner being entitled to participate."

2. That the scheme should be financed by the Milk Marketing Board—"For these services, it is suggested that the practitioner should receive an annual fee of 12s. 6d. per dairy animal in the herd inclusive of mileage. . . . It is further suggested that the *per capita* fee of 12s. 6d. which the veterinary practitioner receives shall be met as follows: 10s. to be paid by the farmer participating in the scheme, the money to be raised by means of a levy administered by the Milk Marketing Board, deducted from the farmer's monthly cheque and spread over a period of twelve months; the remaining 2s. 6d. to be provided either by the Ministry of Agriculture or by a gallon levy on all milk sold through the Milk Marketing Board."

3. "It is recomended that the Animal Health Division of the Ministry of Agriculture should administer the scheme."

After discussion the meeting decided that a scheme should be obligatory.

Proposal 2 disappeared at the meeting when a member announced after there had been some discussion, that he had received a communication intimating that it was not competent for the Milk Marketing Board to allocate money in the manner proposed.

The third proposal was apparently made without the prior consent of the Ministry.

The proposals for administration and finance of this scheme collapsed.

The new proposals now being discussed are likewise incomplete. This was apparent at the meeting.

The proposed new scheme is voluntary; an attempt was made to secure compulsion. The profession should have a clear and concise statement of the grounds upon which a compulsory scheme was rejected. If it be that our profession could not carry out such a scheme on the grounds of numbers or efficiency, then on close examination it seems that someone must have blundered badly. Rumours are prevalent but an alternative statement is certainly needed and to it the profession is entitled.

It is stated that another proposal is that disputes between practitioners and their clients are to be referred to a new body, yet to be set up. The profession should know the constitution and powers of such a body before the members sign an agreement of acceptance.

To me as a member of the Council of the R.C.V.S. which possesses the statutory power of adjudication upon the efficiency and conduct of our members, it appears that the above are two points with which the R.C.V.S. must be closely concerned.

Surely it would be well for these points to be definitely cleared up before anyone else is asked to vote, for it would not be correct to conclude that the genuine opinion of the profession had been secured upon a matter concerning which it has no real and definite knowledge.

It is not customary to ask the members of a learned profession to take a decision of the highest order as this certainly represents, on verbal promises or statements, and even these could not be made authoritatively on this occasion.

J. Share Jones.

Pentrebychan Hall,
Nr. Wrexham.
September 25th, 1941.

. . . . . .

To the Editor of the Veterinary Record

Sir,—In considering the letters you have published from time to time on the Survey Committee's Report, one point strikes me forcibly—none of your correspondents appears to have noticed that a revolution has taken place in this country: a revolution which in Spain it took a civil war to consummate; in Italy, gallons of castor-oil, and much "strong-arm" work"; in Germany private armies, the concentration camp and political assassination. I refer, of course, to the incontestable fact that England is now, of its own free will, a National Socialist State. It is not, and never can be, a police State; the State exists to serve the people, not the people to serve the State.

Our economic system, built up under the Victorian doctrine of "laissez faire," tottered during the last war. It is crashing in this one. The practice of "laissez faire" (it is perhaps too much to elevate it to the dignity of an economic doctrine), with its vast private fortunes at one end of the scale, and the slums and degradation of the industrial revolution at the other, had such attendant evils that one finds it difficult to escape the conclusion that this war, with its basic changes in national economic concept, is an expiation for a century of opportunism.

This change in concept is at present largely expressed in a regimentation surpassing anything known in these islands, save perhaps under Cromwell. Much of this regimentation has come to stay, and it seems to me that the Survey Committee's Report can, therefore, only be considered in its true perspective against this background of "Socialism."

I am aware that the Report (in common with much recent agricultural legislation) represents only the short-term policy of the Association. So, whatever our view of the findings, we should surely attempt to work them if, and only if, we can conscientiously do so as a matter of public service. It is feasible, however, that a minority may exist who look on the findings of the Survey Committee as conceived merely in the financial interest of the profession. I do not see how any such, who, at the same time have the public welfare at heart, can co-operate in the scheme.

The Report, therefore, much as I dislike certain details, has my support for what, if anything, it is worth. But at the same time I regard it as essential that the Association be urged to promulgate at any rate the broad outline of its long-term policy, that contact be strengthened with men of vision in the agricultural world—such men as Sir George Stapledon, Sir Daniel Hall, Michael Grahame and J. W. Robertson Scott—men who, whether we like it or not, will have the shaping of rural policy after the war. No one hates bureaucracy more than I, but it is useless—and it is worse than useless, it is folly—not to realise that the days of lucrative private practice are gone. Some of the recent huge movements of population will persist: "Garden Cities" will grow up round many of the present rural war production factories which will survive the peace and take the place of much destroyed urban industry. And, most important of all to us, some extended and permanent form of nationalisation of the land is inevitable. It is, therefore, vital, if we are to have any continued usefulness as a profession, that our planning be national and not parochial; not carried out in a water-tight compartment and practised by grace of the N.F.U. "We are all members one of another."

Yours faithfully,
Paul Crosfield.

Chipping Norton,
Oxon.
September 13th, 1941.

. . . . . .

To the Editor of the Veterinary Record

Sir,—The profession will be ill-advised if it rejects this scheme, but the latter will have to be restricted in its scope until the profession knows the amount of work which it can undertake with any prospect of success. The suggestion put forward in a previous communication, that the scheme should be taken over by the Animal Health Division, may not meet with universal approval, any more than some of the statements made in the Report, and whilst very few will disagree that the diseases with which it concerns itself are ones which require attention, very few will agree that it would be a practical proposition, even if we had the staff, to attempt to deal with them *en bloc*. If directed and controlled by the Animal Health Division, a guarantee that only work capable of execution is accepted, should be ensured.

We are gambling far too hazardously not only on the amount of work which we assume we can undertake, but on the percentage of success: as good as guaranteed beforehand, with no experience of these diseases to the extent envisaged, on which to base it.

The general line of treatment advocated for mastitis is the one which merits the severest criticism. The profession is told that it is unnecessary, and in fact may prove fatal to the animal, if treatment is withheld until a laboratory examination has established the causal organism. It would appear from the Report that undue haste is not necessary, for it is stated, quite correctly, that in some forms of mastitis, treatment is more often attended with success if it is carried out when the animal is going dry. In an acute case, nobody would delay treatment until the causal organism was ascertained, but would give what was considered appropriate, at the same time taking a sample for examination. It will prove as futile to attempt treatment, in most cases in

ignorance, as it will prove incorrect to claim success afterwards from mere clinical appearance of the milk.

The present chaotic state of affairs existing in regard to the double intradermal tuberculin test might to a large extent be rectified, if the golden opportunity now presented, of testing the very large number of cattle being sent to collecting centres was seized, and the test results compared with the *post-mortem* findings. The older members of the profession, with an extensive experience of the subcutaneous test (now impracticable in view of the amount of testing now undertaken) must marvel at the difficulty in which we younger ones find ourselves, in forming what to them, was a very easy opinion.

They must still further wonder why, if in doubt, we do not now solve our problem, by the only and very obvious method just mentioned and well within our reach: and they will no doubt, with their seasoned experience, advise us to settle this problem first, before seeking fresh fields to conquer, and perhaps in the end finding ourselves in a tangle, from which it will be not easy to extricate ourselves.

Yours faithfully,
J. F. D. Tutt.

"Rothiemurchus,"
St. Cross,
Winchester.
September 29th, 1941.

* * * * *

TUBERCULOSIS ERADICATION IN THE U.S.A.

To the Editor of the Veterinary Record

Sir,—The leading article in the *Record* of September 6th, dealing with the achievements of the veterinary profession in the U.S.A., would have been more informative regarding tuberculosis eradication if the following particulars were supplied:—

(1) Method of tuberculin testing adopted.
(2) Potency and dosage of tuberculin used.
(3) How the potency and dosage compares with the much-criticised Weybridge tuberculin.

The answer to the last question might effectively dispose of the fourth point raised in Mr. Beckett's letter of September 1st.

Yours faithfully,
J. Fox.

"Yondercott,"
Taunton.
September 9th, 1941.

[In the initial stages of the campaign the subcutaneous test was employed, but it was soon replaced by the single intradermal method in the caudal fold. The exact dose is not prescribed, but about one minim of tuberculin, sufficient to form a small bleb, is injected in the superficial tissues. The B.A.I. periodically tests the purity and potency of its own tuberculin and of that manufactured under Government licence by the method of comparative assay in the sensitised guinea-pig. We have no official knowledge of the answer to question 3.—*Editor.*]

* * * * *

THE RELATIONSHIP BETWEEN CANINE HYSTERIA AND DOG BISCUIT

To the Editor of the Veterinary Record

Sir,—Mr. Hancock's article in the *Record* of September 20th interests me very much, because in 1919 when I started practice after demobilisation I was asked to see a kennel of Labradors, as when they were out shooting, most of the animals, five I think, all suddenly "went off the deep end." This was the first I had seen of hysteria, and I put it down as originating in the diet. I examined the biscuits, which came from a firm in Norwich, and which consisted of broken biscuit with meat added. I advised the keeper, a very sound elderly man, to cut out the biscuits and get some Spratt's dog cakes, which he did, and he had no more trouble. In my own mind I thought it probably arose from the added meat. I sent some of the biscuit to Professor Hobday to be examined, but nothing could be made out of the biscuit to account for the trouble.

Two days after the above had happened, I was asked to see another kennel of Labradors with much the same history. I asked about the biscuits, and found that they came from the same firm at Norwich. I advised a change of biscuits, but this man, who was not such a good type as the other old keeper, thought my advice was not correct and went on feeding the Norwich biscuit as he had 3 or 4 cwt. by him. The result, I heard afterwards, was that four of those dogs had to be destroyed.

It is quite a common thing to hear that when dogs are out shooting, if one gets hysterical others not in the same kennel will "go off" also, and on more than one occasion, when the pointer and setter trials are held in this county in the spring, cases occur of one animal showing the trouble and others follow suit.

Please excuse these rough notes, but this article gave me much pleasure and I felt impelled to record my experiences.

Yours faithfully,
T. G. Heatley.

Woodbridge,
Suffolk.
September 20th, 1941.

* * * * *

HEAT STROKE IN A HORSE

To the Editor of the Veterinary Record

Sir,—Mr. Crosfield's letter in to-day's issue of *The Veterinary Record* reminds me of a case I saw this summer on July 8th. The subject was a 12-year-old Shire type gelding which had been mowing for many hours on the previous day in extremely hot sunshine. In the early daylight hours of the following day I found him with a staggering gait and a desire to keep walking, and walking through pond, bog, reed bed, hedge or anything that came his way in spite of the attendant's violent efforts to hold him. The animal had a vacant look and breathed heavily. The membranes were slightly injected, pulse rapid and weak and the temperature was moderately elevated. There were no further symptoms suggestive of colic or lung trouble. Urine and faeces were normal. A diagnosis of heat stroke was made and the only treatment given was to advise turning the animal into a cool, darkened loose box. The horse recovered during the next 24 hours.

I, too, should be interested to hear if colleagues with veterinary experience in hot climates think this diagnosis was correct.

Yours faithfully,
Sydney Jennings.

Yew Tree House,
Knowle,
Nr. Birmingham.
September 27th, 1941.

* * * * *

APPARATUS FOR UDDER INFUSION

To the Editor of the Veterinary Record

Sir,—With reference to the communication from Mr. Steele-Bodger, informing us that the Norden Gravity Outfit is no longer obtainable in this country, it has been found that the Special Injector for Calcium Borogluconate, marketed by Messrs. Willows, can easily be adapted for udder infusion, if a piece of rubber tubing of sufficient length to extend to the bottom of the container is pushed on to the piercing portion of the injector. The tubing carrying the needle simply requires the substitution of a teat syphon.

Yours faithfully,
J. F. D. Tutt.

"Rothiemurchus,"
St. Cross,
Winchester.
September 29th, 1941.